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Diabetes & its Complications

Systemizing the Development of a Mind-set Framework for Patient-centered Care Using AI: A Worked Example with Pre-diabetes

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ABSTRACT

This paper presents a framework for personalized care in pre-diabetes management, with a particular emphasis on understanding the mind-sets of patients, guided by Mind Genomics and developed from the training set of a popular LLM (large language model). The framework has been crafted to empower healthcare professionals to structure, understand and address the needs and desires of patients. Through a comprehensive AI analysis of patient mind-sets, journey stages, and communication strategies contained in LLM (large language models), this paper offers potentially valuable insights to enhance the provision of effective patient care. The methods section gives a detailed explanation of how mind-sets, journey stages, and assessment tools were developed. The findings present detailed tables that document various mind-sets, stages of the journey, and suggested language for offering patient support emerging from the AI. The discussion explores the implications and limitations of the framework. The paper finishes by suggesting the benefits emerging from this mind-set based personalized care for pre-diabetes management. Future research directions are suggested to validate the framework in clinical settings and explore its adaptability to other chronic diseases.

Keywords
Healthcare, Pre-diabetes, Patient Mind-Sets.

Introduction

Pre-diabetes is a common condition which impacts a large number of individuals globally. If not addressed, it has the potential to progress into full-blown diabetes. Therefore, it presents a considerable challenge for healthcare systems and necessitates tailored approaches to ensure effective care. Understanding the patient's mind-set is a key factor in effective management, as people may have varying attitudes and beliefs about their condition [1,2].

It is crucial to establish a mind-set framework for patient-centered care in pre-diabetes to identify the relevant needs and challenges for each patient are effectively addressed, thus tailoring the care. Through the utilization of mindsets and journey stage, healthcare professionals can delve into the thoughts and emotions of their patients, enabling them to offer more impactful assistance and guidance. This approach draws inspiration from the research of Rappaport and Moskowitz, blending academic rigor with a more relaxed and practical approach [3-6]. This framework is a promising versatile tool that needs to be validated through clinical research. Even at this conceptual stage of development, the framework can enable healthcare professionals to gain a deeper understanding of their patients with pre-diabetes and effectively address their needs.

This paper presents one of the early steps in the evolving science of Mind Genomics, with the focus on using AI to create the basis for better health outcomes through synthesizing information to suggest next steps in 'behavior' [7,8]. The emphasis here is on information provided to suggest behaviors, rather than clinical interventions. The framework presented here identifies obstacles to following treatment plans, dispelling misunderstandings about the condition, and providing support which aligns with the patient's perspective. Through a templated set of structured AI-generated prompts healthcare professionals may streamline this process and

deliver care which is both efficient and effective.

Healthcare professionals have the ability to customize their recommendations to better assist patients in managing their pre-diabetes by taking into account factors such as motivation, attitudes towards diet and exercise, and beliefs about their condition. Understanding the 'thought processes' of individuals with pre-diabetes may generate more appropriate interventions and enhanced health outcomes. By tailoring the approach to each individual, AI may empower patients to manage their health and adopt healthy habits, proactive steps to possibly ward off or slow down the onset of diabetes.

Incorporating an AI-based mind-set framework for patient-centered care in pre-diabetes is a forward-thinking and creative way to tackle the increasing global health issue of pre-diabetes. By creating a system comprising structured AI prompts to generate information about patient needs for particular situations, healthcare professionals may quickly understand what might allow them to deliver highly personalized and impactful care. This framework has the potential to bring about a significant change in the management of pre-diabetes, ultimately leading to improved health and well-being for millions of individuals across the globe. Furthermore, if the approach ends up working and if the inevitable improvements are applied to the system, the world of medicine may have a new tool to teach the proverbial 'bedside manner' to 'newbies,' and indeed to anyone interested in becoming patient-centric [9,10].

Method

Synthesizing Patient Mind-Sets

The patient mind-set framework, based on the latest research in Mind Genomics, provides valuable insights into the psychological and behavioral aspects of individuals with pre-diabetes. The paper presents a conceptual model focusing on the various stages of the patient journey for pre-diabetes. This model offers valuable insights into the common progression and experiences which patients may undergo. Although not based on a formal systematic review of the literature, the conceptual model used to create the framework of mindsets, journeys, messaging and assessment draws from academic observations and real-world clinical observations. Table 1 shows the first output of the effort, showing various aspects of individuals' well-being, including their approach to health, emotional reactions to their diagnosis, strategies for managing their condition, and subtle non-verbal signals which may offer insights into their state of mind.

1. A comprehensive understanding of how individuals with pre-diabetes perceive their condition is crucial for providing effective support. Some people may approach their health with a positive mind-set, seeing their diagnosis as an opportunity to make beneficial changes to their lifestyle. In contrast, other people might take on a more pessimistic outlook, feeling overwhelmed or simply coming to terms with their situation. Understanding these complementary attitudes can help healthcare providers provide the support and guidance needed to empower patients in taking charge of their health.
2. A good grasp on emotions is essential for individuals with pre-diabetes to effectively handle their condition. Emotional responses may vary depending on the circumstances. People's emotions vary; some feeling fear, anger, or sadness, whereas others feeling motivated and determined to make positive changes. Understanding these emotional responses can help healthcare professionals offer emotional support, counseling, or connect patients with resources to help them navigate the emotional challenges which come with pre-diabetes.
3. Understanding behaviors is a crucial element of the patient mind-set framework. People with pre-diabetes can exhibit a wide range of behaviors, from diligently following their treatment plan to completely neglecting their health. By identifying these patterns, healthcare professionals can offer personalized interventions, such as advice on nutrition, physical activity, and medication management, to help patients develop healthier habits and improve their overall well-being.
4. Non-verbal cues can provide valuable insights into the mind-set of individuals with pre-diabetes. Nonverbal cues, e.g., body language, tone of voice, and facial expressions, can reveal emotions, attitudes, and behaviors which patients may not express verbally. By paying attention to these non-verbal cues, healthcare providers can develop a better understanding of their patients' needs and concerns, enabling them to adjust their approach accordingly.

Synthesizing the Patient Journey

The patient journey comprises several steps, viz., stages, each with its own unique features and expected timeframes.

1. Typically, the first stage involves an initial consultation, during which the patient has a conversation with a healthcare professional to talk about their symptoms and medical background. The duration of this first stage can vary, ranging from 15 minutes to an hour, depending on the level of complexity involved in the case.
2. After the initial consultation, the second stage usually involves diagnostic testing, which may include x-rays, blood tests, or imaging studies. The duration of this second stage can vary, ranging from a few days to a few weeks. The timeframe depends on factors such as the availability of tests and the necessity for additional evaluation.
3. Once the diagnostic testing is finished, the third stage typically involves planning the treatment. This entails the healthcare provider crafting a tailored treatment plan which takes into account the test results and the unique requirements of the patient. The duration of this third stage can vary, ranging from a few days to a few weeks. It depends on factors such as the complexity of the case and the availability of treatment options.
4. Once the treatment plan is in place, the fourth stage usually involves implementing the treatment. There are different interventions that may be required, such as medication, physical therapy, surgery, and so forth. The duration of treatment can vary, lasting from weeks to months or even years,

Table 1: The four mind-sets of individuals with pre-diabetes as synthesized by LLM (large language model).

MIND-SET NUMBER & NAME	ATTITUDES	EMOTIONAL RESPONSES	BEHAVIORS	NON-VERBAL CUES
1. DENIAL	Resistant to lifestyle changes, believes diagnosis is temporary or incorrect	Frustration, anger, confusion	Ignores dietary and exercise recommendations, avoids discussing the condition	Crossed arms, avoiding eye contact
2. OVERWHELMED	Feels powerless and unable to manage the condition effectively	Anxiety, stress, helplessness	Struggles to adhere to treatment plans, frequently misses appointments	Fidgeting, nervous gestures, tearfulness
3. DETERMINED	Motivated to make necessary changes, takes an active role in self-management	Optimism, hope, resolve	Follows dietary and exercise plans, regularly monitors blood sugar	Engaged posture, direct eye contact, nodding
4. RESIGNED	Accepts the diagnosis but lacks motivation to make significant lifestyle changes	Apathy, sadness, resignation	Inconsistently follows treatment plans, passive in discussions about the condition	Slumped posture, flat affect, sighing

depending on the condition and how well the treatment works.

5. After the treatment phase is finished, the next step usually involves follow-up care. During this phase, the healthcare provider keeps an eye on the patient's progress and makes any necessary adjustments to the treatment. This stage can continue for an extended period, depending on the duration of the condition and the requirement for ongoing care. At the end of the patient journey, we reach the post-treatment phase. This is when the patient has finished their treatment and shifts their attention towards maintaining their health and preventing any future issues. This stage can extend indefinitely, as individuals maintain a commitment to healthy living and regular check-ups.

Table 2 lists the summarized stages of the patient journey, with descriptions and expected durations. Table 3 aligns journey stages, mind-sets, and best words to help patients (again synthesized by LLM) [11,12].

Table 2: Summary of the Synthesized Patient Journey.

JOURNEY STAGE	DESCRIPTION	EXPECTED DURATION
1. DIAGNOSIS	Initial diagnosis of pre-diabetes, often during routine check-ups or screenings	1-2 weeks
2. EDUCATION	Learning about the condition, its implications, and management strategies	2-4 weeks
3. ADAPTATION	Adjusting lifestyle and habits to incorporate dietary changes and physical activity	3-6 months
4. MAINTENANCE	Sustaining healthy behaviors and regularly monitoring blood sugar levels	Ongoing

Assessing Patient Mind-Sets in Pre-diabetes: Tools and Strategies for Personalized Support

It is essential to grasp the mind-set of individuals with pre-diabetes in order to provide personalized support which motivates them to make the required lifestyle changes. Pre-diabetes plays a crucial role in the progression towards type 2 diabetes. It happens when people experience slightly higher blood sugar levels, but not to the extent of being considered diabetic. We now introduce two AI-designed tools, the Patient Mind-Set Questionnaire (PMSQ) and the Patient Mind-Set Interview (PMSI), are introduced to assess patient mind-sets in pre-diabetes [13]. These tools have been designed by AI to assess the thoughts, feelings, and actions of individuals with pre-diabetes, providing healthcare professionals with valuable insights to tailor interventions for maximum effectiveness.

The **Patient Mind-Set Questionnaire (PMSQ)** comprises a set of open-ended questions designed to gain an understanding of the mind-set of individuals with pre-diabetes. Below are 15 example questions that can be included in the questionnaire:

1. How do you perceive your current health status in relation to pre-diabetes?
2. What are your thoughts and feelings about making lifestyle changes to prevent the progression to diabetes?
3. How motivated are you to engage in regular physical activity?
4. What is your perception of the role of diet in managing pre-diabetes?
5. Do you feel confident in your ability to make sustainable changes to your lifestyle?
6. What are your main barriers to adopting healthier habits?
7. Have you received adequate support or information about pre-diabetes management?
8. How do you cope with stress and emotional challenges which may impact your health?
9. Do you have any concerns or fears about developing diabetes in the future?
10. How important do you think it is to follow a personalized care plan for pre-diabetes?
11. Have you set specific goals for managing your pre-diabetes?
12. How does your family and social support network influence your health-related decisions?
13. What strategies have you tried in the past to improve your health outcomes?
14. Are there any cultural or social factors which may affect your approach to managing pre-diabetes?
15. How do you envision your health and well-being in the long term?

The second tool, the **Patient Mind-Set Interview (PMSI)** offers a personalized and comprehensive method to evaluate patient mind-sets in pre-diabetes. The PMSI tool facilitates personal interactions

Table 3: Journey stage, mind-set, and synthesized 'best words'.

Journey stage	Mind-set	Best Words Suggested By AI to Help Patient with that Mind-set
DIAGNOSIS	Denial	"Understanding," "support," "manageable"
	Overwhelmed	"Guidance," "step-by-step," "you're not alone"
	Determined	"Proactive," "taking control," "positive steps"
	Resigned	"Options," "quality of life," "support system"
EDUCATION	Denial	"Clear information," "addressing concerns," "open discussion"
	Overwhelmed	"Prioritizing," "breaking it down," "asking questions"
	Determined	"Empowered," "learning," "taking charge"
	Resigned	"Realistic goals," "finding motivation," "small changes"
ADAPTATION	Denial	"Gradual progress," "trying new things," "benefits"
	Overwhelmed	"One day at a time," "self-care," "celebrating successes"
	Determined	"Building habits," "staying committed," "seeing results"
	Resigned	"Finding balance," "enjoyable activities," "support network"
MAINTENANCE	Denial	"Lifestyle," "long-term health," "staying on track"
	Overwhelmed	"Stress management," "asking for help," "adjusting plan as needed"
	Determined	"Inspiring others," "maintaining progress," "resilience"
	Resigned	"Finding purpose," "self-acceptance," "focusing on positives"

Table 4: Example of strong performing elements on the PMSQ scale for each mind-set.

MIND-SET	STATEMENT THAT WOULD GENERATE A RATING OF 4-5 ON THE PMSQ 5-POINT SCALE (1=DOES NOT DESCRIBE ME AT ALL .. 5 =DESCRIBES ME PERFECTLY)
DENIAL	I believe my pre-diabetes diagnosis is temporary or incorrect.
OVERWHELMED	I feel powerless and unable to manage my pre-diabetes effectively.
DETERMINED	I am motivated to make the necessary changes to manage my pre-diabetes.
RESIGNED	I accept my pre-diabetes diagnosis but lack motivation to make significant lifestyle changes.

Table 5: Format for the PMSI, including sample patient replies, keywords, and non-verbal cues.

MIND-SET	SAMPLE PATIENT REPLY	KEYWORDS TO LISTEN FOR	NON-VERBAL CUES
DENIAL	"I don't think this diagnosis is accurate. I feel fine."	"temporary," "incorrect," "feel fine"	Crossed arms, avoiding eye contact
OVERWHELMED	"I'm struggling to make all these changes. It is just too much."	"struggling," "too much," "can't do it"	Fidgeting, nervous gestures, tearfulness
DETERMINED	"I'm ready to do whatever it takes to manage my pre-diabetes."	"ready," "whatever it takes," "manage"	Engaged posture, direct eye contact, nodding
RESIGNED	"I know I have pre-diabetes, but I don't think I can change my lifestyle at this point."	"can't change," "too late," "no point"	Slumped posture, flat affect, sighing

between healthcare professionals and patients, allowing for open expression of thoughts, concerns, and motivations. The PMSI offers a space to establish trust, connection, and understanding between patients and healthcare providers, which is essential for encouraging positive changes in behavior and improving long-term health results. By actively engaging in attentive listening and asking thoughtful questions, healthcare providers can gain valuable insights into the mind-set of individuals who have pre-diabetes. This more focused interaction enables the healthcare provider to customize interventions and treatments which better meet their patient or client needs. Table 4 presents part of the PMSQ. The patient would assign a rating. Table 4 shows four mind-sets, and the statement that would generate a rating of 4-5 on the PMSQ 5-point scale [14].

The Patient Mind-Set Interview (PMSI) is introduced with the following paragraph: "As we work together to manage your pre-diabetes, it would be helpful for me to understand how you typically cope with the challenges of living with this condition. Could you share with me how you usually respond when faced with difficult situations or decisions related to your pre-diabetes?" [15]. Table 5 provides a format for the PMSI, including sample patient replies, keywords, and non-verbal cues [16].

With the help of tools like the PMSQ and PMSI, healthcare professionals can get a complete picture of how patients with pre-diabetes think and offer tailored assistance to meet their specific requirements and overcome obstacles. These tools provide individuals with the means to actively manage their health and well-being, inspire them to make lasting lifestyle changes, and

assist them in effectively navigating the challenges of pre-diabetes management. Ultimately, understanding the mind-set of patients with pre-diabetes is essential for delivering tailored care which empowers them to live healthier and more fulfilling lives.

Discussion: Implications of the Framework

The patient mind-set framework offers a valuable approach to enhance treatment adherence and patient satisfaction in pre-diabetes management. This innovative approach has the potential to lead to improved treatment outcomes and increased patient engagement by grasping the distinct perspectives of each patient, healthcare professionals can customize their communication and support approaches to better cater to their patient's needs. On the other hand, the framework does have limitations, including the possibility of biases and the requirement for empirical validation. Ongoing research and careful refinement are essential to ensure its practicality in real-world scenarios.

The incorporation of the patient mind-set framework into digital assessment tools for pre-diabetes management has the potential to make a significant impact. These tools can enhance the assessment process, provide personalized recommendations based on patient mind-sets, and enhance overall patient care. Using digital tools can improve access to healthcare, encourage patient engagement, and ultimately improve the well-being of individuals with pre-diabetes. When developing these tools, it's crucial to consider factors such as data privacy, accessibility, and usability, to ensure adoption.

Discussion and Conclusions

Understanding and addressing the unique needs and perspectives of each individual in diverse patient populations is crucial in clinical settings. The patient mind-set framework can be a valuable tool for healthcare providers to achieve this objective. By validating this framework, healthcare professionals can customize their approach to pre-diabetes management according to the unique mind-set of each patient, enhancing outcomes and patient satisfaction. The versatility of the framework in addressing different aspects of pre-diabetes management, including medication adherence and complication prevention, enables a holistic approach to care, one which takes into account both medical and psychosocial factors. By integrating the patient mind-set framework into digital tools, it may be possible to revolutionize personalized pre-diabetes management. These digital tools help patients to receive tailored resources and support, and more important, support which is appropriate and caters to their unique needs and preferences. By using these tools, patients may end up becoming more involved in their own care, taking responsibility for their health as they become intellectual involved with the process. The result may be better outcomes, such as improved glycemic control and quality of life, respectively. Furthermore, evaluating the influence of implementing the framework on patient outcomes can offer valuable insights into the effectiveness of this approach, guiding future endeavors to enhance care for individuals with pre-diabetes. From a more general point of view and considering the 'proscenium arch' of medical care, the just-presented approach to the patient mind-set may be relevant for other chronic diseases which present similar self-management difficulties. The successful migration of the mind-set approach coupled with the inevitable improvements produced by different minds has the potential to drive progress in the realm of patient-centered care, along with better outcomes for a diverse group of patients. The benefits should range from more effective medical professionals to happier patients, and finally perhaps even to reduced medical costs across the entire medical spectrum world-wide.

Note: The process is explicated at: *https://youtu.be/9kk0P6ZfNIA?si=GfYShmuCGa7QusP8*

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Reference

1. Beulens JWJ, Rutters F, Ryden L, et al. Risk and management of pre-diabetes. Eur J Prev Cardiol. 2019; 26: 47-54.
2. Perreault L, Færch K. Approaching pre-diabetes. J Diabetes Complications. 2014; 28: 226-233.
3. Moskowitz H, Harizi A, Papajorgji P, et al. Discourse on Method Rapid, Efficient, Cost-Effective Creation of 'Wikis of the Mind'. Business Advancement through Technology Volume I. 2022. 159-180.
4. Moskowitz H, Rappaport SD, Braun M, et al. Talking to the Diabesity Patients Upon Admission to the Ward: how Mind Genomics Plus Ai May Inform the Nurse and Improve the Patient's Experience. J Clin Nur Rep. 2024; 3: 1-7.
5. Moskowitz H, Todri A, Papajorgji P, et al. Sourcing and Vetting Ideas for Sustainability in the Retail Supply Chain the Contribution of Artificial Intelligence Coupled with Mind Genomics. International Journal on Food System Dynamics. 2023; 14: 367-380.
6. Moskowitz HR, Rappaport S, Saharan S, et al. What Makes 'Good Food': Using AI to Coach People to Ask Good Questions. Food Sci Nutr Res. 2023; 7: 1-9.
7. Moskowitz HR. 'Mind genomics': The experimental, inductive science of the ordinary, and its application to aspects of food and feeding. Physiology and behavior. 2012; 107: 606-613.
8. Moskowitz HR, Rappaport S, Saharan S, et al. What Makes 'Good Food': Using AI to Coach People to Ask Good Questions. Food Sci Nutr Res. 2023; 7: 1-9.
9. Gennatas ED, Chen JH. Artificial intelligence in medicine: past, present, and future. In Artificial intelligence in medicine. 2021; 3-18.
10. Mintz Y, Brodie R. Introduction to artificial intelligence in medicine. Minim Invasive Ther Allied Technol. 2019; 28: 73-81.
11. Vallis M, Ruggiero L, Greene G, et al. Stages of change for healthy eating in diabetes relation to demographic eating-related health care utilization and psychosocial factors. Diabetes care. 2003; 26: 1468-1474.

12. Miller WR, Rollnick S. Motivational interviewing: Helping people change. Guilford press. 2012.
13. Wallston KA, Rothman RL, Cherrington A. Psychometric properties of the perceived diabetes self-management scale PDSMS. J behav med. 2007; 30: 395-401.
14. Polonsky WH, Fisher L, Earles J, et al. Assessing psychosocial distress in diabetes development of the diabetes distress scale. Diabetes care. 2005; 28: 626-631.
15. Coulter A, Entwistle VA, Eccles A, et al. Personalised care planning for adults with chronic or long-term health conditions. Cochrane Database of Syst Rev. 2015; 2015: CD010523.
16. Rappaport SD, Moskowitz H. Enhancing Patient-Centered Care in Leukemia Treatment Insights Generated by a Mind-Set Framework Co-developed with AI. Cancer Studies and Therapeutics. 2024; 9: 1-7.